DATE: 1/30/79

To: Product Manager Garner (23)
TS-767

Through: Dr. Gunter Zweig, Chief
Environmental Fate Branch

Through: ~~Mr. James Conlon, Acting~~ Director,
Hazard Evaluation ~~Division~~, TS-769

From: Review Section No. 1
Environmental Fate Branch

Attached please find the environmental fate review of:

Reg./File No.: 100-583

Chemical: Metolachlor=[2-chloro-N-(2-ethyl-6-methylphenyl-N-(2-methoxy-1-methylethyl)acetamide]

Type Product: Herbicide

Product Name: Dual

Company Name: CIBA-GEIGY

Submission Purpose: Ammendment

Date in: 10/30/78

Date out: 1/30/79

1.0 Introduction

1.1 Chemical Name: Metolachlor =[2-chloro-N-(2-ethyl-6-methylphenyl-N-(2-methoxy-1-methyl-ethyl)acetamide]

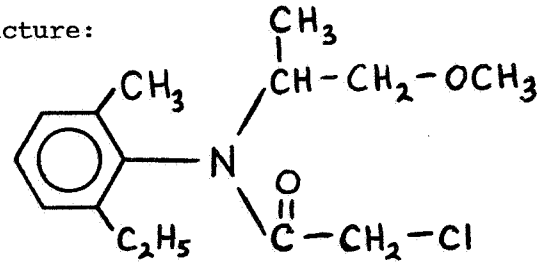
1.2 Trade Name: Dual 6E Herbicide, Dual 8E Herbicide

1.3 Percent Active:

Dual 6E - 68.5% Metolachlor, 6lbs. a.i./gal.

Dual 8E - 86.5% Metolachlor, 8 lbs. a.i./gal.

Chemical Structure:



1.5 The registrant requests amended registrations permitting label provisions for the following new uses for broad spectrum weed control in corn.

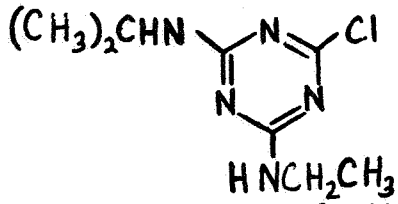
Dual 6E and Dual 8E

1. Applied alone or in tank mixtures with AAtrex 80W, AAtrex 4L, AAtrex 4LC, or AAtrex Nine-0 through center pivot irrigation systems.

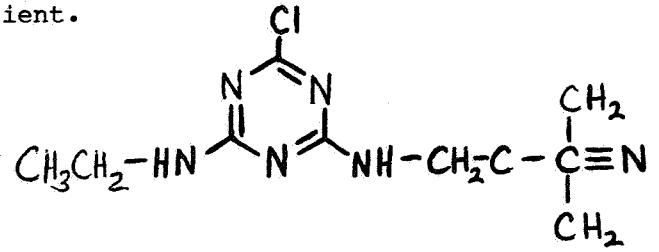
2. Tank mixtures with Bladex 80W or Bladex 4L applied preplant incorporated or preemergence in water or fluid fertilizers.

Bicep - Application through center pivot irrigation systems.

1.6 AAtrex contains atrazine (2-chloro-4-ethylamino-6-isopropylamino-S-triazine) as active ingredient.



1.7 Bladex contains cyanazine [2-(4-chloro-6-ethylamino-S-triazin-2-ylamino)-2-methylpropionitrile] as active ingredient.



1.8 Bicep is a prepackaged combination mix containing atrazine and metolachlor as active ingredients.

2.0 Directions for Use

2.1 Dual 6E - See our review dated 1/6/78. The following changes and additions appear on the proposed label:

2.1.1 Dual 6E + AAtrex Tank Mixture

Center Pivot Irrigation Application: Dual 6E alone or in tank mixtures with AAtrex may be applied through center pivot irrigation systems that apply water uniformly. Mix a minimum of 1 part herbicide with 1 part water and inject into the center pivot system using a positive displacement pump. Agitate to keep the mixture from separating. Apply in 1/2 - 1 inch of water. Use higher volume for finer textured soils.

Precautions: (1) Apply only through irrigation systems containing antisiphon and check valves to prevent contamination of well during shutdown and overflow of solution tank. (2) Inject ahead of any right angle turn in the main line to insure adequate mixing. (3) Chemical injection pumps and water pumps must have interlocking controls to insure simultaneous shutoff. (4) Application when drift may occur from windy conditions, when there are system leaks, or when nozzles are not distributing uniformly may cause crop injury. (5) Where sprinkler distribution patterns do not overlap sufficiently, unacceptable weed control may result. Too much overlap may cause crop injury.

Rates: When using Dual 6E in a tank mix with AAtrex Nine-0, one lb. of AAtrex 80W is equivalent to 0.9 lb. AAtrex Nine-0.

Rotational Crops: 1) If corn treated with Dual 6E + AAtrex is lost due to poor germination, hail, flood, insects, etc., corn may be replanted immediately. Do not make a second broadcast application. If the original application was banded and the second crop is planted on the untreated rows, a second band treatment may be applied. 2) After harvest, plow and till soil in either the fall or the spring to minimize possible injury to rotational spring-seeded crops, regardless of rate used. 3) Corn and soybeans may be planted the spring after treatment. Do not graze or feed forage or fodder from soybeans to livestock. Injury may occur to soybeans planted in north-central and northwest Iowa, south-central, and southwest Minnesota, and northeast Nebraska, and southeast South Dakota the year following application on soils having a calcareous surface layer. 4) If applied after June 10, do not rotate with crops other than corn the next year, as crop injury may result.

5) In the High Plains and Intermountain areas of the West where rainfall is sparse and erratic or where irrigation is required, use only when corn is to follow corn, or a crop of untreated corn is to precede other rotational crops. 6) Small grains may be planted 15 months following treatment. 7) All other crops may be planted 18 months after application.

2.1.2 Dual 6E with Bladex 80W or Bladex 4L Tank Mixture

Preplant Incorporated: Apply tank mixture to soil and incorporate into top 2 inches of soil before planting using a disk, harrow, rolling cultivator, or similar instrument. If furrow irrigation is used or when a period of dry weather is expected after application, this method is desireable. If corn is planted in beds, incorporate tank mix after bed formation. Preemergence: Apply during planting (behind plants) or after planting but before weeds or corn emerge.

Dual 6E & Bladex on Corn - Broadcast Rates/A

	Percent organic matter in soil			
	Less than 1%	1-2.5%	2.5-4%	Over 4%
Soil texture	Pts. Dual 6E + Lbs. Bladex 80W*	Pts. Dual 6E + Lbs. Bladex 80W*	Pts. Dual 6E + Lbs. Bladex 80W*	Pts. Dual 6E + Lbs. Bladex 80W*
COARSE: Sand, loamy sand	DO NOT USE	1 2/3-2 + 1-1.8	2-2 1/3 + 1.8-2	2 2/3 + 2.2
Sandy loam	1 2/3 + 1	1 2/3-2 + 1.5-1.8	2-2 1/3 + 1.8-2.2	2 2/3 + 2.5
MEDIUM: Loam, silt loam, silt	2 + 1.5	2-2 1/3 + 1.8-2.2	2 1/3-2 2/3 + 2.2-2.5	3 + 2.8
FINE: Sandy clay loam, silty clay loam, clay loam, sandy clay, silty clay, clay	2 + 1.8	2 1/3-2 2/3 + 2-2.5	2 2/3-3 + 2.5-2.8	3 1/3 + 3.1
Muck or peat soils	NOT RECOMMENDED			

*When using Bladex 4L, use equivalent rates. One lb. of 80W equals 1.6 pts. of 4L.

Rotational Crops: 1) If replanting is necessary, corn may be replanted immediately without a second broadcast application. A second band treatment may be applied if the original treatment was banded and the crop is replanted in the untreated row middles. 2) Small grains may be planted 4 1/2 months after treatment. Corn, soybeans, root crops, and small grains may be planted the spring following treatment. Do not graze or feed forage or fodder from small grains or soybeans to livestock. All other rotational crops may be planted 18 months after application without restriction.

2.2 Dual 8E - Refer to our review dated 12/6/77. The following changes and additions appear on the current proposed label:

Rotational Crops: Small grains may be planted 4 1/2 months following treatment. Corn, soybeans, root crops, and small grains may be planted the spring following treatment. Do not graze or feed forage or fodder from small grains or soybeans to livestock. All other rotational crops may be planted 18 months after application without restriction.

2.2.1 Dual 8E + AAtrex tank mixture

Dual 8E + AAtrex on Corn

Broadcast rate per acre

Soil texture	Less than 3% organic matter		3% organic matter or greater	
	Dual 8E	AAtrex 80W*	Dual 8E	AAtrex 80W*
COARSE: Sand, loamy sand, sandy loam	1 1/4 pts.	1.25 lbs.	1 1/2 pts.	1.5 lbs.
MEDIUM: Loam, silt loam, silt	1 1/2 pts.	1.5 lbs.	2 pts.	2 lbs.
FINE: Silty clay loam, sandy clay loam, silty clay, sandy clay, clay loam, clay	2 pts.	2 lbs.	2-2 1/2 pts.	2-2.5 lbs.**
muck or peat soils		DO NOT USE		

*When using AAtrex 4L, AAtrex 4LC, or AAtrex Nine-0, use equivalent rates. One lb. of 80W equals 1.6 pts. of 4L (4LC) or 0.9 lb. Nine-0.

**For cocklebur, yellow nutsedge, and velvetleaf control on fine-textured soils above 3% organic matter: Apply 2.5 lbs. of AAtrex 80W, or 4 pts. of AAtrex 4L (4LC), or 2.25 lbs. of AAtrex Nine-0 with 2-2 1/2 pts. of Dual 8E per acre.

Rotational Crops: Restrictions are the same as for the Dual 6E + AAtrex tank mix.

Dual 8E alone or in tank mix with AAtrex may be applied either preplant incorporated, preemergence, or via center pivot irrigation systems in the same manner as indicated in the Directions for Use for Dual 6E.

2.2.2 Dual 8E Tank Mix with Bladex 80W or Bladex 4L

Apply preplant incorporated or preemergence as outlined in the directions for Dual 6E. Rates appear below:

Dual 8E + Bladex - Corn - Broadcast rate per acre

	Percent organic matter in soil							
	Less than 1%		1-2.5%		2.5-4%		Over 4%	
Soil texture	Pts. Dual 8E	Lbs. +Bladex 80W*	Pts. Dual 8E	Lbs. +Bladex 80W*	Pts. Dual 8E	Lbs. +Bladex 80W*	Pts. Dual 8E	Lbs. +Bladex 80W*
COARSE: Sand, loamy sand	DO NOT USE		1.25-1.5	+ 1-1.8	1.5-1.75	+ 1.8-2	2	+ 2.2
sandy loam	1.25	+ 1	1.25-1.5	+ 1.5-1.8	1.5-1.75	+ 1.8-2.2	2	+ 2.5
MEDIUM: Loam, silt loam, silt	1.5	+ 1.5	1.5-1.75	+ 1.8-2.2	1.75-2	+ 2.2-2.5	2.25	+ 2.8
FINE: Sandy clay loam, silty clay loam, clay loam, sandy clay, silty clay, clay	1.5	+ 1.8	1.75-2	+ 2-2.5	2-2.25	+ 2.5-2.8	2.5	+ 3.1
Muck or peat soils	NOT RECOMMENDED							

*When using Bladex 4L, use equivalent rates. One lb. of 80W equals 1.6 pts. of 4L.

Rotational Crops: Restrictions are the same as for Dual 6E + Bladex tank mix.

2.3 Bicep 4.5L

Provision for center pivot irrigation application is added to the label. Directions and precautions are the same as indicated for Dual 6E alone and in tank mix with AAtrex.

3.0 Discussion of Data

Both submitted and referenced environmental chemistry data are utilized to support this proposed use.

3.1 Refer to our reviews of 100-583 dated 8/8/77 and 1/6/78 for our reviews of field dissipation studies of metolachlor tank mix with atrazine.

3.2 The following report was included in the present submission:

Dual Plus Bladex Tank Mix Soil Dissipation Studies, L. G. Ballantine and M. M. Herman, Biochemistry Department Agricultural Division, Ciba-Geigy Corporation, Greensboro, N.C., Report No. ABR-78071, Sept. 21, 1978.

Plots of silt loam soil (described below) in Nebraska and New York were treated individually with Dual 8E at 2.5 lbs. a.i./A, with Bladex 80W at 2.5 lbs. a.i./A, and with a tank mix of the two at the above rates.

Soil in the Nebraska test (AG-A 4642) was classified as silt loam (pH = 6.4, OM = 2.9%, CEC = 14.0, Bulk Density = 1.26 g/cm^3) and plots were subject to 24.83 inches of rainfall during the 190 day test interval.

Soil in the New York test (AG-A 4819) was classified as Madalin Silt Loam (pH = 6.3, OM = 2.8%, CEC = 9.1, Bulk Density = 1.14 g/cm^3) and plots received 28.65 inches of rainfall during the 186 day test interval.

Samples were taken to 6" and metolachlor was extracted and analyzed by analytical method AG-303 with modifications. Cyanazine was analyzed by Shell Chemical Company according to Modesto Method Series, MMS-R-202-4.

Results

Nebraska

Dosage lb a.i./A	Method of Application	Sampling Interval (Days)	Residues (ppm) Metolachlor	Cyanazine
2.5 metolachlor + 2.5 cyanazine	Pre	0	1.20	1.10
		30	0.16	0.09
		61	0.28	0.09
		128	0.08	<0.01
		190	<0.05	<0.01
2.5 metolachlor + 2.5 cyanazine	PPI	0	0.78	0.76
		30	0.28	0.09
		61	0.30	----
		128	0.06	<0.01
		190	<0.05	<0.01
2.5 metolachlor (alone)	PPI	0	0.56	
		30	0.42	
		61	0.35	
		128	0.06	
		190	<0.05	
2.5 cyanazine (alone)	PPI	0		0.53
		30		0.09
		61		0.06
		128		<0.01
		190		<0.01

New York

Dosage lb a.i./A	Method of Application	Sampling Interval (Days)	Residues (ppm) Metolachlor	Cyanazine
2.5 metolachlor + 2.5 cyanazine	PPI	0	0.44	0.37
		29	0.30	0.17
		60	0.21	0.06
		119	0.10	0.02
		186	<0.05	----
2.5 metolachlor (alone)	PPI	0	0.42	
		29	0.29	
		60	0.21	
		119	0.08	
		186	0.07	
2.5 cyanazine (alone)	PPI	0		0.43
		29		0.09
		60		0.03
		119		0.01
		186		----

Conclusion

Dissipation was not changed via these tank mixes.

4.0 Conclusions

4.1 Tank mixes of metolachlor and atrazine applied preemergence or preplant incorporated are already acceptable for use on corn. Atrazine is currently registered for use on corn, file no. 34771-G, 7/14/76, but no environmental chemistry data has been submitted on atrazine.

4.2 There is no evidence of increased persistence of metolachlor or cyanazine when used in a tank mix. Cyanazine is currently registered for use on corn.

5.0 Recommendations

5.1 The environmental risks posed by the preposed tank mixes are not considered significantly different from those posed by the already registered individual uses.

5.2 We require no additional data for the proposed applications through the center pivot irrigation systems.

Ronald E. Ney, Jr., 1/30/79

Paul W. Davis 1/30/79 Paul W. Davis 2/6/79

Review Section No. 1
EFB-HED